Trapezoid-quadrilateral technique of frontalis suspension with synthetic material

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ABSTRACT

الأهداف: تم الإبلاغ عن النتائج المبكرة بكونها ناجحة جداً في عمليات تعليق العضلة الجبهية، ولكن تمت رؤية تكرار ذلك على المدى الطويل. يعد التشوه في جفن العين العلوي مشكلة أخرى ذات أهمية. التقنيات الجديدة مطلوبة لعلاج هذه المشاكل.

الطريقة: أجريت العملية الجراحية بالطريقة الجديدة لأربعة وعشرين عيناً من ثمانية عشر مريضاً تم إدخالهم مستشفى نعمان التدريبي ومركز الأبحاث بأنقرة في الفترة ما بين يناير 2002م وديسمبر 2004م. يعاني جميع المرضى من تدلي الجفن الخلقي وبلغت أعمارهم من 2 الى 27 عاماً. 12 منهم من الإناث و6 من الذكور. في هذه الطريقة الجديدة تم تثبيت العضلة الجبهية الرباعية الجوانب من نقطتين.

النتائج: تم فتح المحور البصري وكان هنالك تماثل جيد بين العينين في انتهاء فترة 14 شهر من المتابعة. كان هنالك تشكل ورم حبيبي في كلتا العينين لأحد المرضى و اعتلال القرنية في كلتا العينين لمريض آخر وتكرار حدوث التدلي في إحدى العينين لمريض واحد.

خاتمة: لا يسبب أسلوب تعليق العضلة الجبهية الرباعية الجوانب شبه المنحرفة باستعمال مادة اصطناعية أي تشوه حسي ويوفر ارتفاع متساوٍ للجفن العلوي. لذلك اقترحنا أن يكون هذا الأسلوب مفضلاً في علاج تعليق العضلة الجبهية الرباعية الجوانب شبه المنحرفة باستعمال مادة اصطناعية.

Objectives: To describe a new method of frontalis suspension (FS) to prevent recurrences, undercorrection, and cosmetic problems, and to share our experiences in treatment of congenital ptosis using the trapezoid quadrilateral technique (TQT) and synthetic materials.

Methods: Twenty-four eyes of 18 patients, admitted to Ankara Numune Training and Research Hospital 3rd Eye Clinic, Ankara, Turkey, between January 2002 to December 2004, were operated with a new method. All the patients had congenital ptosis, and they were 2-27 years old. Twelve of them were female and 6 of them were male. In this new method, the upper eyelid is fixed to the frontalis muscle from 2 points.

Results: The visual axis was open, and there was good symmetry between both eyes at the end of a mean of 14 months follow-up. There was granuloma formation in both eyes of one patient, exposure keratopathy in both eyes of another patient, and recurrence of ptosis in one eye of one patient.

Conclusion: The TQT of FS with synthetic material does not cause any esthetic deformity and produces a balanced lifting in the upper eyelid. Therefore, we propose that it could be the preferred method in FS procedures performed with inorganic materials.

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Frontalis suspension (FS) is a surgical intervention preferred in severe blepharoptosis patients when the function of the levator muscle is poor or absent.[1] Most surgeons prefer variations of the technique initially described by Payr in 1909,[2] and reintroduced by Wright in 1922.[3] The technique was popularized by Crawford in 1956.[4] Many of FS configurations were proposed to have better functional and cosmetic results.[5] Among these, the most preferred ones are the Crawford method for organic materials and the Fox method for inorganic materials.[6] Undercorrection, overcorrection, recurrence, lagophthalmus, entropion, ectropion, notching, lid and lid margin anomalies, infection and granuloma formation are still serious complications of ptosis surgery although there is a lot of different techniques.[7] We describe a new method of frontalis suspension (FS)

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to prevent recurrences, undercorrection, and cosmetic problems, and to share our experiences in treatment of congenital ptosis using the trapezoid quadrilateral technique (TQT) and synthetic materials.

Methods. We operated on 24 eyes of 18 patients, admitted to Ankara Numune Training and Research Hospital 3rd Eye Clinic, Ankara, Turkey, between January 2002 and December 2004, with the TQT of FS. In this case series, all the patients had congenital ptosis of moderate to severe degree (range: 3.0-4.6 mm, mean: 3.86±0.40 mm) and they were 2-27 years old (mean age 10.94±7.54 years). Twelve of them were female and 6 of them were male. In this new method, the upper eyelid is fixed to the frontalis muscle from 2 points, approximately one cm above the brow in line with the medial and lateral canti. Six of the patients were bilateral and the rest unilateral. Approval was obtained from the local ethics committee prior to the commencement of the study, and informed patient consent was received from all study participants. Levator function was either absent or too poor to benefit from levator surgery. Only one patient had 8 mm of levator function. This patient previously underwent a ptosis surgery with an unknown technique. We planned a levator resection first of all, but we had to perform FS since we could not find a healthy levator muscle. All the patients had Bell's phenomenon. Another different patient was a 22 year-old male with bilateral brow ptosis in addition to right upper eyelid ptosis. The silicon cord (SC) was applied to this patient after brow lifting with the incisions above the brows. In our FS technique, 2 skin incisions approximately 2 mm long were made to the upper eyelid. Their locations were determined in the primary looking position. One was in line with the upper temporal and the other with the upper nasal limbus, approximately 2 mm from the lid margin and parallel to it (**Figures 1-3**). Other 2 horizontal incisions, approximately 5 mm long, were placed approximately one cm above the brow in the line with the medial and lateral canti. Blunt dissection was carried up to the frontalis muscle in these incisions above the brow. A SC was used as the inorganic suspension material. This material was introduced from the upper nasal incision with its needle, passed under the orbicularis oculi muscle, and over the tarsus, and orbital septum, and taken out from the first incision place forming a trapezoid-quadrilateral figure. Both ends were fixed with the sleeve of the SC. The sleeve was adjusted so that the upper eyelid margin would be tangent to the upper limbus. The material was fixed to the frontalis muscle in the upper nasal and temporal incisions with 6.0 prolene sutures. In some patients, sutures were used to fix the material to the tarsus and orbicularis oculi.

Figure 1 - Preoperative photograph of a 2 and a half year-old boy with left congenital upper eyelid ptosis.

Figure 2 - The sites of incisions and implantation of silicon cord in frontalis suspension.

Figure 3 . The photograph of the same patient at the end of one month.

Skin incisions were closed with 6.0 absorbable vicryl sutures. The same procedure was performed in the other eye in bilateral patients. Cold compresses were applied in the early postoperative period. Oral nonsteroid antiinflammatory drugs and antibiotic ointments were ordered. The follow-up periods ranged between 6 to 36 months (mean 14.0±6.63 months).

Results. The visual axis was open, and there was good symmetry between 2 eyes at the end of a mean of 14 months of follow-up. The amount of ptosis correction achieved was 3.47±0.43 mm (range: 2.6-4.2 mm). The height of palpebral fissure was measured to be 7.64±0.61 mm (range: 6.5-8.8 mm). The amount of ptosis in the last visit of the patients was 0.39±0.41 mm (range: 0-1.4 mm). We saw complications in 3 patients. There was granuloma formation in both eyes of one patient. This was a 3.5 year-old female patient with bilateral ptosis. The SC was extruded from the frontal incisions at the end of the second month. We repaired the incision sites burying the SC, but it extruded again. We had to explant it a few months later. Due to fibrosis, the upper eyelids did not drop. We saw exposure keratopathy in both eyes of a female patient. This patient came to the first postoperative control 2 weeks after the surgery, and she had corneal edema with intense epithelial defects. We planned a conservative approach. After 2 weeks the corneas healed leaving small faint opacities and the lesions did not recur. In another patient, the ptosis recurred in the nasal part of the upper lid at the end of the 6th month. The nasal frontal incision was explored, the silicon tube was found and resutured to the frontalis muscle with prolene suture. All the patients had lagophthalmus in the operated sides when they intended to close their eyes. The degree of lagophthalmus decreased in the following period. We advised them to use antibiotic ointment routinely at bedtime. The patient, we intended to operate with the levator resection, had severe hyperemia in the upper eyelid, but it disappeared at the end of the first month and did not effect the success of the FS procedure. We observed intense hyperemia under the left brow in the patient with bilateral brow ptosis and left upper eyelid ptosis. After the hyperemia resolved, symmetry was seen between both eyes. We did not observe any cosmetic problem related to upper eyelids and brows, except the patient with granuloma formation.

Discussion. The most preferred surgical technique in ptosis treatment is levator resection. When this structure is afunctional we prefer the FS operation. Up to now a lot of different techniques such as pentagon, single rhomboid, double rhomboid, transconjunctival, Crawford base-up single triangle and base-up double triangle have been defined in FS surgery.[5,8] Our technique is similar to the single rhomboid pattern, but there are differences in the incision sites. In the single rhomboid pattern, the upper incisions are made in the upper edge of the brow.[8] The upper incisions in our technique are placed approximately one cm above the brow. The upper lid incisions are made approximately 6 mm from the medial and lateral canthi in the single rhomboid pattern.[8] The lid incisions in our technique are closer to each other. The causes of undercorrection in FS surgery are immobile fixation points, insufficient tightening of the bands during surgery, resorption of the material by the body, insufficient adherence between the tissue and the band, relaxation of the bands after surgery and low safety of the technique. Some solutions were proposed for these problems.[5] Recurrence rates reach 28% in a few series of FS surgery using fascia lata (FL).[7] Fascia lata is thought to be the ideal FS material in children over the age of 4 years. Synthetic materials are preferred under 4 years since the FL is not developed sufficiently. Some authors indicate the use of synthetic materials as a temporary treatment method due to the risk of infection and granuloma formation. These authors give the ratio of ptosis recurrence as 32% in patients operated with FL and as 31.7% in patients operated with synthetic materials, 94.7% of recurrences were seen in tissue bank FL. We saw ptosis recurrence in one of our cases (4.2%) at the end of 14 months of follow-up. Long term follow-up is needed to evaluate the late results of this technique. The ratio of infections is 6.7%, and granuloma formation is 17%[1] in cases with FS. Their conclusions are unacceptable according to these results. However, some authors report a high rate of recurrence in patients operated with lyophilized FL.[9]

We did not see any infection in our cases. There were 2 cases of granuloma formation (both eyes of a patient) (8.3%), which were lower than the ratio reported in the literature. Lam et al[10] reported very successful results in 10 baby patients operated with mersilene mesh. Gabrieli et al[11] also used mersilene mesh with the technique of Fox and reported successful results. However, Mehta et al[12,13] does not prefer mersilene mesh due to the high risk of early soft tissue complications. Instead, they record that they prefer to use alternative non-autogenous materials such as prolene 2.0 suture or autogenous FL. As a result, some authors prefer organic and others prefer synthetic materials in FS surgery. We used a synthetic material, SC, in our patients. We suspended the upper eyelid to the frontalis muscle from 2 points above the brow. Ptosis was successfully corrected in all patients with a good cosmetic result. The amount of ptosis correction was found to be comparable with the results of frontalis suspension surgeries recorded in the literature.[14] The granuloma formation in one patient was not a complication of the technique, but the result of the

use of synthetic materials. Exposure keratopathy is a complication that can be seen in all types of suspension surgeries. Recurrence of ptosis was related to untying of the suture or the release of the suture from the muscle fibers. Suturing of the silicon material to the frontalis muscle is a very important part of this technique. So it should be made carefully. In this method of FS, blunt dissection was carried up to the frontalis muscle in the incisions above the brow and the SC was fixed to the muscle from 2 points. In some patients, fixation sutures were also used in the upper eyelid. As a result, the slip of SC in the postoperative period was prevented.

Another important point is the location of the incisions above the brow. They were located one cm above the brow. The patient can effectively benefit from the action of the frontalis muscle when he wishes to open the eye. Fixation of the SC from 2 points prevents the squeezing of the tissues of the upper eyelid and brow and a better cosmesis can be obtained.

In conclusion, TQT of FS with synthetic materials is a functional and cosmetic operation in the treatment of ptosis patients with poor or absent levator function. The TQT of FS with synthetic materials does not cause any esthetic deformity and produces a balanced lifting in the upper eyelid. Therefore, we propose that it could be the preferred method in FS procedures performed with inorganic materials.

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